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ABSTRACT

This bulletin presents data taken from the report, "Federal Funds for Research, Development, and Other Scientific Activities," Volume 23. Data given for 1974 and 1975 are estimated and do not represent final obligations. The survey on which the report is based was conducted at the midpoint of fiscal year 1974 when the President's budget for fiscal year 1975 had just been forwarded to Congress. Thus, data for 1975 do not reflect subsequent Congressional actions or changes made by Executive apportionment. Trends in Federal research and development (R&D) obligations are discussed and a summary graph is presented. Programs of individual agencies are described. Extramural performers account for the bulk of Federal R&D performance. A table presents a summary of obligations by major performer for fiscal years 1973-1975. Federal obligations for research by field of science for these same fiscal years, 1973-1975, are presented in tabular form as well as distribution of Federal R&D obligations to the 10 states leading in such support in 1973 for fiscal years 1963, 1968, 1972, and 1973. (EB)

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Federal R&D Funding for FY 1975 Continues to Decline as a Share of The Total Budget

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
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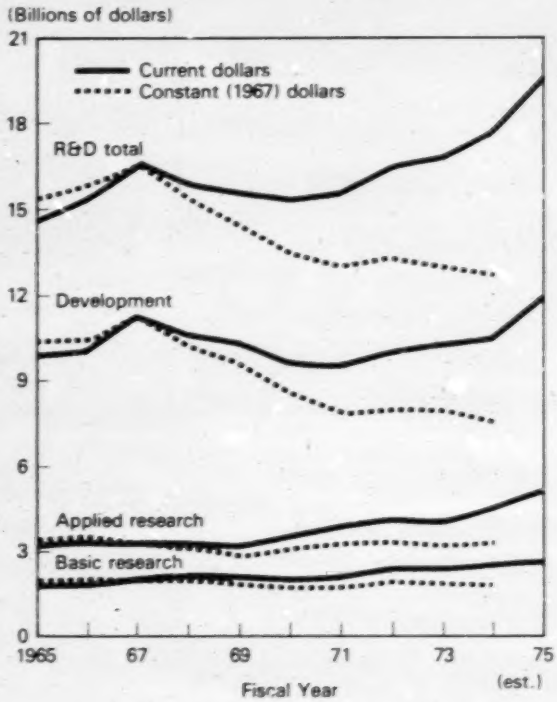
The following data are taken from the report Federal Funds for Research, Development, and Other Scientific Activities, Vol XXIII to be published later this year. Data for 1974 and 1975 are estimated and do not represent final obligations. The survey on which the report is based was conducted at the midpoint of fiscal year 1974 when the President's budget for fiscal year 1975 had just been forwarded to Congress. Thus, data for 1975 do not reflect subsequent congressional actions or changes made by Executive apportionment.

Federal R&D obligations (plant excluded) totaled $16.8 billion in fiscal year 1973 and were expected to amount to $17.7 billion in fiscal year 1974 and $19.6 billion in fiscal year 1975—increases of 5.5 percent and 10.4 percent, respectively. When the totals are translated into constant dollars, however, these gains are reduced or eliminated. In real terms the 1974 R&D performance level is below that of any year during the 1965-75 decade. (See chart.) Furthermore, any reasonably estimated deflator will almost certainly reveal a substantial reduction in the relative increase proposed for 1975.

R&D totals have grown less rapidly than the Federal budget as a whole. In 1965 R&D and R&D plant expenditures reached their highest share of the overall Federal budget, at 12.6 percent; each year thereafter the share has dropped. In the present period the ratio continues to decline, from 7.1 percent in 1973 to an estimated 6.6 percent in 1975.

Another way of measuring the R&D component of the budget is by comparing R&D and R&D plant expenditures with *controllable* budget outlays. In recent years, an increasing portion of the rising Federal outlays has represented fixed cost and open-ended programs, such as social insurance, interest, and veterans benefits. The remainder of the budget, which includes R&D programs and which is subject to annual appropriation and annual decisionmaking, has grown more moderately. R&D and R&D plant expenditures, as a share of controllable outlays, fell from 16.4 percent in 1967, the first calculable year, to 14.7 percent in 1968, then to a low point of 13.7 percent in 1970. Since 1970 the R&D portion has held its own within this part of the budget. The R&D share is expected to be 14.8 percent in both 1974 and 1975.

Trends in Federal R&D obligations



SOURCE: National Science Foundation

Character of Work

In 1975 the estimated increases for applied research and development represent significant relative growth, but the slight rise for basic research represents virtually no change from the previous year and probably a decrease in constant dollars. As a result, the share of basic research in the Federal R&D total has dropped to 13 percent, compared with 14 percent in 1974; the share of development is 61 percent, compared with 59 percent in 1974. Applied research retains the same position in both years, at 26 percent.

The 1975 applied research total of $5.1 billion, a 10-percent increase over 1974, reflects expanded programs of a

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number of agencies, primarily the National Aeronautics and Space Administration (NASA), the Department of Defense (DOD) (mainly the Air Force), and the four major energy support agencies: the Department of the Interior, the Environmental Protection Agency (EPA), the Atomic Energy Commission (AEC), and the National Science Foundation (NSF). Their increases more than offset a Department of Health, Education, and Welfare (HEW) decrease in applied research support (mostly in the National Institutes of Health (NIH)).

The $11.9 billion in development funding, a 13-percent increase over the previous year, is the direct result of expanded programs of three agencies: DOD, AEC, and Interior.

The small 1975 increase of 1 percent for basic research, which brings the total to $2.6 billion, is the net result of the expanded effort of three agencies, NSF, AEC, and Interior, offsetting NASA and HEW decreases. The increased effort bears a relationship to the national energy program.

Federal obligations for research and development by agency: fiscal years 1973-75

(Dollars in millions)

Agency	Actual	Estimates	
	1973	1974	1975
Total	$16,821.1	$17,743.2	$19,597.1
Department of Defense	8,404.2	8,598.5	9,607.9
National Aeronautics and Space Administration	3,060.9	3,026.0	3,071.2
Department of Health, Education, and Welfare	1,837.6	2,347.2	2,232.5
Atomic Energy Commission	1,363.2	1,430.9	1,703.9
National Science Foundation	479.9	529.7	653.2
Department of the Interior	243.4	286.1	557.1
Department of Agriculture	366.5	386.4	405.9
Department of Transportation	310.6	358.1	396.5
Environmental Protection Agency	180.6	174.0	342.5
Department of Commerce	190.6	210.1	262.8
Office of Economic Opportunity	108.9	49.5	
Other agencies	274.8	346.7	363.3

SOURCE: National Science Foundation

1975 Programs

In 1975 the growth in R&D programs of individual agencies is determined for the most part by the energy crisis and military strategy. Otherwise, the general policy is to hold the line with relatively few programs growing or contracting significantly.

DOD not only continues to produce the predominant share of the Federal R&D total (49 percent in 1975), but in the 1975 budget this agency's scheduled increase of $1,009 million outweighs any other agency increase.[1] In relative terms the gain of 12 percent is not as high as for some other agencies. The Navy and the Air Force plan expansion in their R&D activities overall; the Army increase is minimal.

The Navy scheduled the greatest increase to cover work on the Trident submarine ballistic missile system, the strategic cruise missile system, and the CH-53E helicopter, among other programs. The Air Force increase is directed to support of the air-launched cruise missile, the Minuteman, advanced ICBM technology, the Advanced Warning and Control System (AWACS), the Advanced Airborne Command Post, the B-1 advanced strategic bomber, and the EF-111A electronic warfare support aircraft. The Army, despite only a small net increase, planned for expanded work on such individual programs as the Site Defense of Minuteman, the tactical forward area air defense system, and the advanced attack helicopter.

For NASA, the rise in R&D support between 1974 and 1975 is small enough to represent a leveling. This agency's share of total Federal R&D obligations is an estimated 16 percent. The leading NASA program in 1975 is the space shuttle with a 68-percent increase that more than offsets the decrease resulting from completion of Skylab. Other manned space programs are also reduced, except for the Apollo-Soyuz Test Project to carry out the rendezvous and docking of an Apollo spacecraft with a Soviet spacecraft within a year. The Viking and Mariner 10 planetary exploration programs are cut back in 1975 although strong increases are scheduled for outer planet missions. Under physics and astronomy major attention is directed to work on three High Energy Observatories.

In 1975, HEW will account for an estimated 11 percent of the R&D total even though its overall R&D program is somewhat reduced. The chief reason is that $162 million in funds for NIH, originally scheduled for obligation in 1973, was not obligated until 1974, causing that year's figure to be unexpectedly high. Nine out of 10 institutes within NIH are scheduled for decreases in 1975; only the National Cancer Institute shows an increase. HEW's Alcohol, Drug Abuse, and Mental Health Administration will also be cut back. Of HEW's education programs, the National Institute of Education (NIE) is expected to expand its R&D programs extensively, although the anticipated decline in the Office of Education's (OE) programs more than offsets the NIE increase.

AEC is scheduled for an increase of $273 million, or 19 percent, in 1975, virtually all of which is related to energy R&D programs. Civilian reactor development is the heart of the AEC effort with chief activity centered on the liquid metal fast breeder reactor. Gas cooled and molten salt breeder reactor programs are also expanded, as is general reactor safety analysis. The highest relative gain for any AEC energy program is for controlled thermonuclear fusion research.

NSF is another agency whose increase in 1975 ($124 million) is largely related to the national energy problem. NSF's strong 23-percent rise is partly caused by higher support to basic research projects to encourage work that could eventually relieve the energy shortage. The NSF increases within its RANN program are for energy investigations, notably solar and geothermal energy research and energy research and technology efforts.

The Department of the Interior is a third agency to receive increased R&D funding in 1975 almost entirely derived from energy concerns. Its $271 million gain is mostly the result of vastly increased work in fossil fuels by the Bureau of Mines in coal, petroleum, and oil shale, and by the Office of Coal Re-

[1] On the basis of congressional appropriation action as of September 1974, the DOD increase would be reduced by approximately $700 million.

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search in coal liquefaction, coal gasification, and direct combustion as well as advanced power systems. Also, the Geological Survey will greatly increase efforts on offshore oil and gas appraisal.

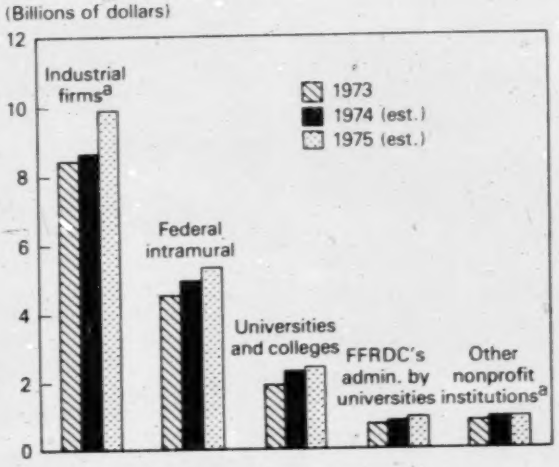
The Department of Agriculture's small 1975 increase reflects the continuing research programs of the Agricultural Research Service and the Cooperative State Research Service. These cover production, marketing, and use of agricultural products, as well as research at agricultural experiment stations.

The Department of Transportation (DOT) registers a moderate 1975 gain of 11 percent, most of it connected with research by the Federal Railroad Administration and R&D programs of the Urban Mass Transportation Administration. Another increase, for the Office of the Secretary, is concerned with energy conservation.

EPA is the fourth agency whose R&D program total was importantly advanced in the 1975 budget because of the energy crisis—in the amount of $169 million, or 97 percent. In the case of this agency a group of environment programs under its sponsorship were substantially expanded as a corollary to the national energy program. They support a new EPA role as coordinator of the overall Federal energy-related environment R&D effort.

The rise in R&D support for the Department of Commerce in 1975 is chiefly brought about by the transfer of OEO's Community Development Program to the Office of Minority Business Enterprise within Commerce. In 1975 OEO is no longer supporting research and development although a number of its programs continue under the sponsorship of other agencies.

Federal R&D obligations by major performer: FY 1973-75



[a]Includes Federally Funded Research and Development Centers (FFRDC's) administered by this sector.

SOURCE: National Science Foundation

Performers

Extramural performers continue to account for the bulk of Federal R&D performance—an estimated 73 percent in 1975, or a total of $14.3 billion. Industrial firms will perform an estimated 51 percent of the total R&D effort (including FFRDC's).[1] The industry share has dropped substantially since the early sixties when it reached 66 percent. This sector is heavily supported by DOD, NASA, and AEC, and the decline in NASA funding since 1966 has been the main cause of both the absolute and relative drop in industrial performance. In the current (1973-75) period dollar support to industry is on the increase, largely from DOD programs, but in 1975 the increase is also derived from the energy effort, much of it generated by AEC.

Universities and colleges represent a growing performance sector in the period since 1960. In 1975, they are expected to carry 12 percent of the Federal R&D workload, compared with 8 percent in 1965. In the past decade the three principal support agencies have been HEW, NSF, and DOD. Together these agencies will provide four out of five dollars to the university-and-college sector in 1975. HEW (primarily NIH) will account for an estimated 50 percent of the total and NSF for 22 percent. Since 1965 the NSF share has increased more rapidly than those of other agencies. On the other hand, DOD support has dropped considerably, and in 1975 is expected to comprise 8 percent of the total, compared to 24 percent in 1965.

Federal intramural performance will amount to an estimated $5.3 billion in 1975, a record high. For the last five years the intramural share of the Federal R&D total has been 27 percent to 28 percent, higher than at any time since the late fifties.

Fields of Science

Since 1972, research support to the life sciences has exceeded that to any other field, with chief funding responsibility taken by HEW. The share of this field in the Federal research total is an estimated 31 percent in 1975 compared with 24 percent in 1965. The engineering share of the total

Federal obligations for research by field of science: fiscal years 1973-75

(Dollars in millions)

Agency	Actual	Estimates	
	1973	1974	1975
Total	$6,500	$7,197	$7,674
Life sciences	2,059	2,466	2,363
Psychology	116	138	128
Physical sciences	1,126	1,211	1,370
Environmental sciences	791	812	873
Mathematics	126	142	153
Engineering	1,760	1,909	2,226
Social sciences	296	337	374
Other sciences	226	183	186

SOURCE: National Science Foundation

[1] Federally Funded Research and Development Centers.

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decreased from 33 percent in 1965 to 29 percent in 1975. DOD and NASA are the major support agencies for this field.

Support for the physical sciences decline from 21 percent of the research total in 1965 to 18 percent in 1975, and for the environmental sciences, from 14 percent to 11 percent. The physical sciences are supported for the most part by NASA, AEC, DOD, and NSF, and the environmental sciences by NASA, DOD, and NSF.

The social sciences still take up a relatively small share of total Federal research funding—5 percent in 1975. A decade earlier the share was 3 percent.

Geographic Distribution

The *Federal Funds* report includes a geographic distribution of Federal R&D funds obligated in 1973.[3] California continued to receive by far the largest amount of Federal support and for the second consecutive year showed an increase, following the 1971 low point. The chief cause of the increase was missiles and aerospace contracting by DOD and NASA. The share of California in the Federal R&D total was 23.3 percent in 1973, compared with 35.1 percent in 1963, the first year for which data are available.

Maryland, the second State in size of R&D support in 1973, increased from 5.5 percent of total funding in 1963 to 8.7 percent in 1973. This growth largely reflects increased Federal intramural activity by DOD, HEW, and NASA. Only California and Maryland received more than $1 billion, and both of these States increased their shares in 1973 over 1972.

New York, which had been among the three leading States since 1963, showed greatest dollar reduction in support to any State in 1973 and dropped to a fifth-place position. Massachusetts and Florida, which also reflected losses, were in third- and fourth-place positions, respectively. Despite some shifting of position, the same States, with few exceptions, remain among the leading 10 or 15 year after year.

In 1973 more than $100 million in Federal R&D obligations went to each of 23 States, and 26 States each received as much as 1 percent of the R&D total, about the same situation as in previous years.

Federal Funds for Research, Development, and Other Scientific Activities, Volume XXIII will contain data on scientific and technical information along with more detailed data on R&D funding. The report will be obtainable from the Superintendent of Documents, U.S. Government Printing Office. Detailed statistical tables for Volume XXIII will be published separately in advance of the report and can be obtained from the National Science Foundation, Washington, D.C. 20550.

Distribution of Federal R&D obligations to the 10 States leading in such support in 1973 for fiscal years 1963, 1968, 1972, and 1973

State	1963	1968	1972	1973
Total, all States (Millions of dollars)	$12,251	$15,690	$16,262	$16,886
	Percent distribution			
California	35.1	27.4	21.8	23.3
Maryland	5.5	5.8	8.1	8.7
Massachusetts	4.2	5.1	5.9	5.8
Florida	2.8	5.1	6.3	5.8
New York	7.7	7.5	6.6	5.7
Texas	3.2	5.6	4.0	3.9
New Jersey	3.3	4.3	4.7	3.9
Pennsylvania	3.6	3.9	3.9	3.8
Missouri	1.9	.8	4.2	3.7
Virginia	1.3	1.8	3.3	3.4
All other States	31.4	32.7	31.6	32.0

[1] Includes outlying areas and officer abroad.
SOURCE: National Science Foundation

[3] In 1973 eleven agencies were surveyed, representing 98 percent of total Federal R&D obligations that year. They were DOD, NASA, HEW, AEC, NSF, USDA, DOT, Interior, Commerce, EPA, and OEO.

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